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SUBJECT: Part 21 rept re critical power ratio calculation.Initially reported on 920617.Feedwater Controller Failure analysis & MCPR limits revised.

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WASHINGTON PUBLIC POWER SUPPLY SYSTEM

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August 6, 1992
G02-92-190

Docket No. 50-397

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D.C. 20555

Gentlemen:

Subject: WNP-2, OPERATING LICENSE NPF-21
10 CFR PART 21 REPORT
Δ CRITICAL POWER RATIO (CPR) CALCULATION

This is a 10 CFR Part 21 report submitted in accordance with the requirements of 10 CFR 21.21. Verbal notification of this condition was made to NRC Operations on July 9, 1992. The information required by the regulations is provided below:

- Requirement 1

  Identification of the firm constructing the facility or supplying the basic component which fails to comply or contains a defect.

- Response 1

  Siemens Nuclear Power Corporation
  155 108th Avenue NE, PO Box 90777
  Bellevue, WA 98009-0777

  Siemens Nuclear Power (SNP) provides the nuclear fuel and the supporting transient analysis for WNP-2. SNP discovered a discrepancy in the procedure used to analyze the Feedwater Controller Failure (FWCF) event with the computer code COTRANSA2. This discrepancy impacted the analysis supporting Cycles 7 and 8 and involved an error in the input to the model which represents core pressurization during the FWCF event. The transient analysis for the fuel is considered a basic component since it analyzes the capability to shutdown the reactor and maintain it in a safe shutdown condition. The safety analysis guarantees cladding integrity in response to transient conditions. It provides assurance that fuel cladding failure due to lack of cooling caused by the onset of transition boiling is limited and complies with licensing requirements.

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The cladding is one of the first barriers necessary to provide the capability to prevent or mitigate the consequences of accidents. Thus, the reactor fuel and its supporting analysis meet the definition of a basic component as defined in the regulations.

- Requirement 2

Nature of the defect or failure to comply and the Substantial Safety Hazard (SSH) which is created or could be created by such defect or failure to comply.

- Response 2

One of the definitions of a defect is a condition or circumstance involving a basic component that could contribute to the exceeding of a safety limit, as defined in the WNP-2 Technical Specifications. Technical Specification paragraph 2.1 defines the safety limits for WNP-2. Paragraph 2.1.2 defines the THERMAL POWER safety limit which reads in part, "The MINIMUM CRITICAL POWER RATIO (MCPR) shall not be less than 1.07 up to 4500 MWD/MTU cycle exposure and 1.11 for cycle exposure greater than 4500 MWD/MTU to EOC." As the Δ CPR is used to determine the MCPR the situation described by SNP falls within this definition of a defect.

A SSH exists if there is a loss of safety function to the extent that there is a major reduction in the degree of protection provided to public health and safety. This includes exceeding a safety limit as defined in the WNP-2 Technical Specifications. The determination of a SSH for this case is aided by the attached Figure 1. The fuel and its supporting analysis was delivered with the normal design/operating margin to allow for fuel burnup and flexible rod patterns. The plant is allowed to operate at the Operating Limit Minimum Critical Power Ratio (OLMCPR) which is established by the Δ CPR calculation. However, Plant operation is normally well above the OLMCPR. The severity of FWCF transients is affected by cycle exposure. Actual plant operation during cycle 7 was limited to a cycle exposure well below the exposure of concern. However, if Cycle 7 had operated to the licensing basis energy with the licensing basis axial exposure distribution, and if the power level was between approximately 80 and 92 percent, and if assemblies were at the OLMCPR, and if a licensing basis FWCF transient had occurred, then the error in the analysis could have allowed the CPR to drop below the Safety Limit Minimum Critical Power Ratio (SLMCPR). The Supply System believes this meets the definition of a Potential Defect that could create a SSH as defined above.

This situation is highlighted by the fact that the FWCF transient actually occurred at WNP-2 during cycle 7 on November 19, 1991. Because of the design margin, low fuel burnup, and the fact that the transient occurred from 100 percent power the minimum CPR was well above the SLMCPR as shown in Figure 2. The calculated minimum CPR during the transient was 1.35 compared to the SLMCPR of 1.07.

- Requirement 3

  The date on which the information of such defect or failure to comply was obtained.

- Response 3

  June 17, 1992

- Requirement 4

  In the case of a basic component which contains a defect or fails to comply, the number and location of all such components in use at, supplied for, or being supplied for one or more facilities or activities subject to the regulations of this part.

- Response 4

  WNP-2 does not have the information to respond to this question as it was the purchaser, not the supplier, of the basic component. However, SNP has stated that they have notified all of their affected customers.

- Requirement 5

  The corrective action which has been, is being, or will be taken; the name of the individual or organization responsible for the action; and the length of time that has been or will be taken to complete the action.

- Response 5

  Corrective action to address this concern at WNP-2 has been completed. At the time of notification of the defect, June 17, 1992, SNP had completed their evaluation of the non-conservatism in the FWCF analysis and had established input changes to correct the modeling of core pressurization during FWCF analysis performed with the COTRANSA2 code. Supply System reviews of the non-conservatism concluded the procedural change implemented by SNP was acceptable for FWCF analysis performed with COTRANSA2. SNP was requested to revise the FWCF analysis for Cycle 8 and provide revised MCPR limits for incorporation into the Core Operating Limits Report (COLR). The revised limits were also incorporated into the core monitoring system (POWERPLEX) for use in monitoring thermal operating limits. These actions were completed prior to plant restart in early July 1992.

- Requirement 6

  Any advice related to the defect or failure to comply about the facility, activity, or basic component that has been, is being, or will be given to purchasers or licensees.

- Response 6

  WNP-2 is the purchaser and licensee and does not have any advice to relate.

Any questions concerning this report should be referred to Mr. C.L. Fies, Compliance Engineer, (509) 377-4147.

Sincerely,

G. C. Sorensen, Manager
Regulatory Programs (Mail Drop 280)

CLF/bk
Attachments

cc: JB Martin - NRC RV
NS Reynolds - Winston & Strawn
RR Assa - NRC
DL Williams - BPA/399
NRC Site Inspector - 901A
U. Fresk - SNP

FIGURE 1

TYPICAL CRITICAL POWER RATIO (CPR) APPLICATION

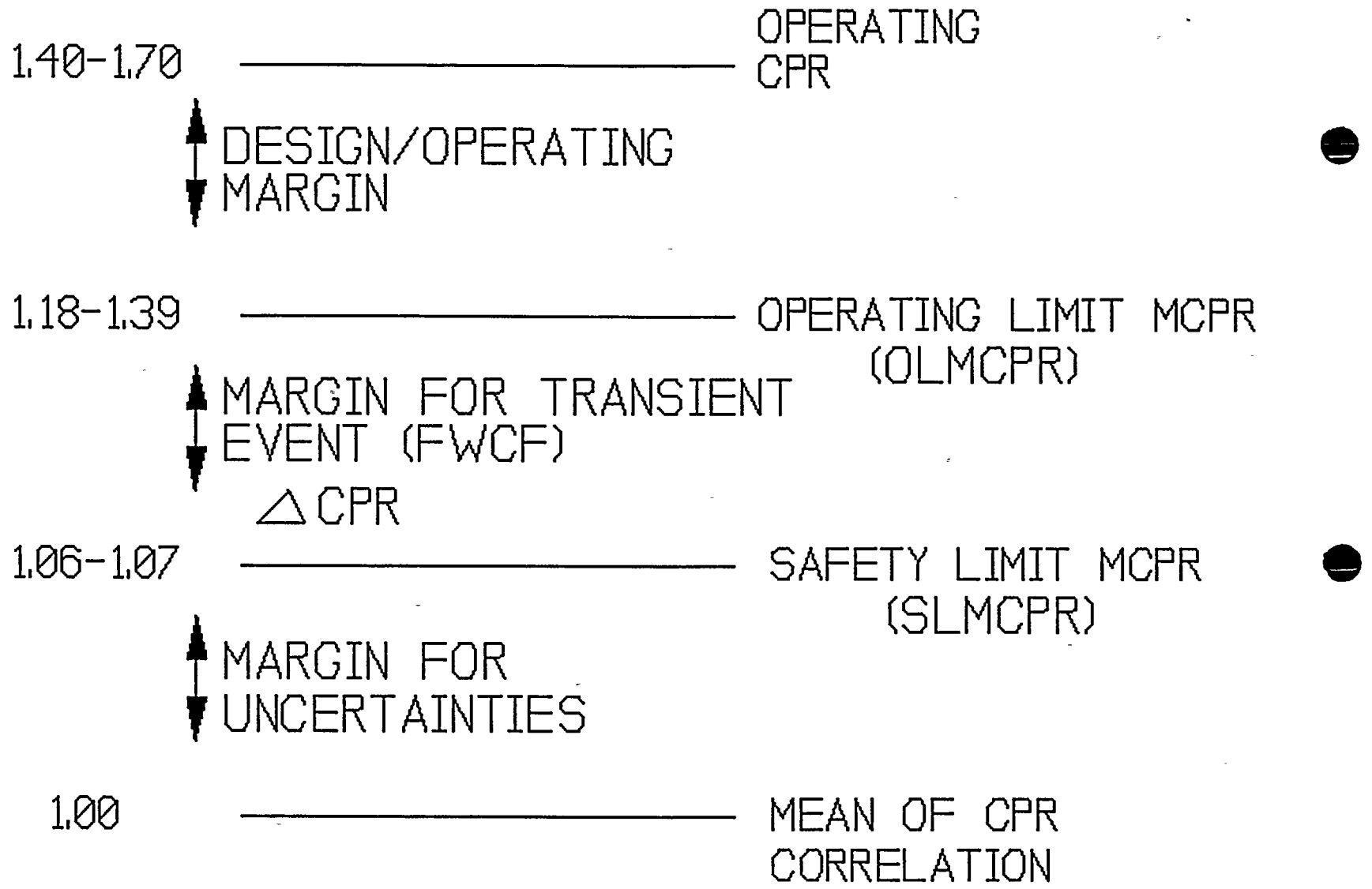

FIGURE 2

CRITICAL POWER RATIO (CPR)

DURING FWCF EVENT NOV 19, 1991